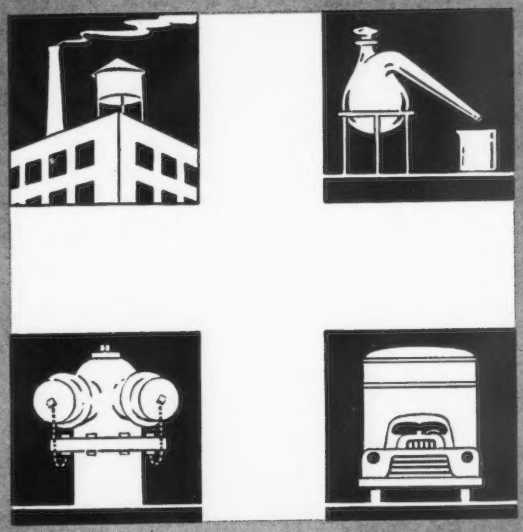
The Journal

OF THE AMERICAN SOCIETY OF SAFETY ENGINEERS



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Articles Discuss "Basics" Of Safety Programing

■ Successful safety programs must be based on the "tried and true" fundamentals, as Society President Donald G. Vaughan points out so ably in his editorial on page 33 of this *Journal* issue.

It seems logical, therefore, for all of us from time to time to review some of these basic principles, methods and procedures—no matter how far we may have advanced professionally.

Implementing this thought, the *Journal* is presenting, in this issue, two articles which deal with vital aspects of an industrial accident prevention program.

Training of supervisors and workers to develop sound attitudes and practices is reviewed by one of the nation's foremost training directors, Ralph M. Hartmann, immediate past president of the American Society of Training Directors, in "Is Training for Safety Different from Other Training?" on page 34.

"Selling a Safety Program to Top Management," another essential for success in safety work, is discussed on page 43 by Joseph A. Menendez, past general chairman of the Society's St. Louis Chapter.

A third article in this issue also might be said, with slightly different meaning, to deal with a basic subject—inclusion of safety considerations at the design or drawing board stage. "Planning Safety into Automation," on page 37, is authored by Thomas E. Seavey, master mechanic for Pontiac.

All three of these articles have been adapted from addresses made by the authors at the 1958 National Safety Congress, in sessions arranged and sponsored by the Society.—Editor

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OUR PRESIDENT SPEAKS ON SAFETY

RECENTLY I READ the following comment:

"Building codes . . . are dull reading, just as technical considerations of most building materials lack the glamour that is attached to more recent developments in other branches of technology. All of us are familiar with the wisecracks made by amateur observers of the building scene to the effect that we still build houses of bricks and mortar just like the Romans. These same people choose to forget that fortunately we still take hot baths, just like the Romans! There are others who make similarly snide remarks about wood as an outmoded material. The ignorance of such speakers is betrayed by their own words since wood still remains one of the most wonderful of all building materials, stronger pound for pound than steel, an excellent insulator in contrast with other structural materials and one that can be readily and easily worked. Similar comments can be made on other 'conventional' building materials. I often am puzzled by the prevalence of the view that just because a thing is old it is necessarily bad and that just because something is new it must be good." *

This statement could have been made concerning accident prevention methods. The safety engineer, to be successful, must use many of the same safety rules and principles that have been fostered for 30 years or more. Underlying each safety program are a few basic items, such as top management interest and active participation, proper selection and training of workers, adequate machine guarding, effective accident investigation and follow-through. We have been talking, preaching and teaching these principles for many years. Being "old stuff" does not make them any less important. In fact, we have no *new* fundamentals for a well rounded safety progrem.

*From "Common Sense and Building Materials," an address by Robert F. Legget, director of the Division of Building Research, National Research Council of Canada, at the February 4, 1959, Building Materials Industry Luncheon in Pittsburgh, Pa., sponsored by the American Society for Testing Materials.

What then is new? The means and methods of selling these basic ideas.

Accident prevention work has increased in recognition and importance because we have found new and better ways to sell our wares. Recognizing the basics as "old stuff," we know we must wrap them up in a a new and more attractive package—one which will have considerable public appeal. We can make these old ideas appear to be new by modernizing our approach, by using the new methods of sales and personnel handling, by incorporating new ideas of management operations.

Safety often has been tagged as a dull subject. Its successful application is not startling, nor does it bring glamorous news headlines. (If accident prevention is unsuccessful, however, many times resulting fatalities and serious injuries make dramatic headlines.) But some favorable newspaper stories have resulted from awards and other forms of recognition bestowed for outstanding safety performance.

Engineers take pride in their training and its emphasis on "getting the facts." Important as facts are, though, in themselves they often are dry reading. The successful safety engineer certainly must apply his engineering training and secure the facts. He must set up the basic principles, even though they are "old stuff," and build his safety program around them.

And after he has established the basic principles, the safety engineer then can go on to find new selling and training methods, keyed to sell top management, supervisors and workers on the "old stuff," the fundamentals which all safety engineers have known and used for years.

As the quoted paragraph above has so aptly stated, don't think that because it is old it is necessarily bad. If the method is sound, use it but remember that, because safety can be a dull subject, it must be brightened up with new wrappings so that it can be sold adequately.

Donald G. Vaughan

DONALD G. VAUGHAN, PRESIDENT
AMERICAN SOCIETY OF SAFETY ENGINEERS

by RALPH M. HARTMANN

IS training for SAFETY different from other training?

author reviews problems of safety training and urges integration into overall job instructor training program for industrial supervisors

A TRAINING MAN is not simply a training man for quality or production—or even safety. Training must reach into every phase of our working life. It will serve no purpose to train a supervisor merely in job instruction methods and neglect to train him in basic principles of management. Similarly, it is unwise to teach employes producton methods without also coaching them in the safeguards that will assure continuity of operation.

In addition to my duties as manager of training and development for the Quaker Oats Company, I am responsible for the functioning of accident prevention effort throughout the Quaker organization. We do not find this inconsistent, nor is safety just an "added duty," because we consider that safety is *one* of several factors that must be built into our operation.

EMPHASIZE INDIVIDUAL RESPONSIBILITY

The more we have studied the problem of accident prevention at Quaker, the more we feel that success in safety is the product of an environment which emphasizes individual responsibility—exercised at all times and at all levels. It follows then that safety training should be so directed as to assist all people in the organization in discharging their safety responsibility; i.e., to get as many people as possible to perform, in the right way, the work assigned to them.

Now, back to the question, "Is training for safety different from other training?"

Today there is no universal agreement among professional training people as to the best methods, materials, etc., to be employed to meet every training need. Then surely there can be no general agreement among training people on this particular subject. My personal opinion is that training (as such) for safety is not different from other training.

REQUIRES SPECIAL APPROACH

However, in the *approach* to safety training, in preparing for and conducting safety training, obviously some different considerations must be kept in mind than if one were, for example, preparing for and conducting training to make people more quality or cost conscious.

Let me suggest we handle our discussion of this

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subject in somewhat this manner. First, let's review a few of the considerations we should keep in mind when we are preparing to do a safety training job. Then, let's examine and discuss a number of specific questions on the subject of safety training. This procedure may help you individually to explore this subject as it applies to your immediate circumstances, so that you may find your own answer to the question, "Is training for safety different from other training?"

Let's take a look as some of the special problems or considerations we should keep in mind when preparing for safety training work.

1. The modern conception of accident prevention seems to identify it as a major executive problem. If so, it then follows that management must be responsible for the formulation of broad, all-inclusive safety policies and provide an organizational structure which will make possible and encourage an effective safety endeavor.

As safety men, do we do the informing, educating and training of our executives so that they have an appreciation of their safety responsibility and the safety job they must do? This means special training for executives is necessary.

2. Another generally accepted concept, to which we subscribe, is that the direct responsibility for safety is in the line supervisors. More and more, management is realizing the dominant position occupied in industry by supervisors and foremen. However, before safety training can be effective with the foremen, this concept must be known and accepted by foremen and supervisors alike.

3. Another point on which there is considerable agreement is that safety, to a large degree, is pretty much a matter of attitude—a state of mind—on the part of an individual. An important phase of the training job is to instill safety consciousness into the individual workman. How many training and safety men consciously consider this factor when preparing for and conducting safety training?

4. In most instances, the mental resistance of the trainee to the subject of safety is greater than the normal resistance to production or quality training; the people to be trained very often are not in a receptive frame of mind. More than in any other area of training, we encounter the attitude that "safety is sissy stuff," "I don't have the time," and so on, which professional safety men know all too well. We must study and know our trainees.

5. Another factor, which has much to do with the receptiveness of individuals to safety training, is the concept that safety is primarily a matter of converting faulty physical conditions. Regardless of all the seemingly convincing data that has been published, industry still devotes a very substantial part of its accident prevention effort to physical conditions. We need to overcome this concept. Steady improvement of physical conditions is a must but, while doing this, we must guard against creating an impression that this is the whole answer to our safety problem.

6. In many concerns, training for safety still is handled on somewhat of an amateur basis. Professional training in industry has made great strides in recent years but much of it has been concentrated on production, management techniques, etc. I also have notice that, in some companies where group training is conducted for safety, the same amount of time, attention and expense usually is not given to the preparation of training materials for safety as is done preparing for other types of training.

7. One additional thought: in our safety training work have we been emphasizing too much the penalities, suffering, etc., that could occur if we do not perform our job correctly and safely? Would our people be more receptive to safety training if it stressed, rather, the *advantages* to working safely?

8. And probably the most important single factor that must be considered when planning safety training activities is *participation,* perhaps the most effective technique known that can be utilized to gain cooperation and acceptance by fellow workers in your accident prevention work. Participation helps to bring about a mutual desire, on the part of operators, supervisors and executives, to work closely together because it creates the conditions necessary for cooperation to occur. How often we proceed to build training activities, never thinking about involving the people to be trained, and then wonder why the training is not accepted enthusiastically!

EXAMINES SPECIFIC QUESTIONS

Now let's examine and discuss briefly a few specific questions on the subject of safety training.

1. Should training for safety be included with other job training? Does stressing safety confuse job sequence while training? Since safety can be achieved only as the job is being done and is an inherent part of the job, then surely safety training

should be a part of job training. This should be the responsibility of the individual's immediate supervisor.

I see no reason why stressing safety, as it relates to job operation, should in any way make less effective the job instruction. However, I see no particular reason why the safety aspects of the job should be emphasized any more than the quality, quantity and other phases of the total job operation.

As regards training to create a safe working attitude in a new employe, more must be done than the safety training provided in connection with on-the-job training. Probably the best time to start this type of training is immediately after a man has been hired.

An effective safety indoctrination program, utilizing various visual aids, first aid and fire equipment and covering a variety of subjects, would be helpful. The objective of such a program should be to create in the mind of the new employe a sense of belonging to a group of people who are interested in their safety as well as that of fellow workers.

2. Another question: "Should training for safety be handled by the supervisor or by the safety man?" We have touched upon this point. Since the supervisor is the man who tells the worker what to do— and normally he will do a much better job of following through on his personal instructions than on instructions given to his workers by a third party —then surely the supervisor should provide job safety training on an individual basis.

On the other hand, certain safety training activities may be handled better on a group basis (such as fire fighting, life saving techniques, proper lifting methods, etc.). Training of employes in such subjects by the safety man or other well qualified people usually is welcomed by supervisory personnel.

3. Some one asked, "How about handling safety training for particularly hazardous jobs as opposed to normal routine?" My reaction is that, as long as the regular supervisor supervises and directs the worker on this particular operation, the supervisor also should give the on-the-job safety training.

4. Another question: "Can we motivate for safety at the same time we train for production?" Surely we can and must. Safety performance is a factor considered in our annual job performance appraisal of all supervisory and management people. This is considered on the same basis as quality, meeting of production schedules and costs.

This helps to motivate supervision. Proper safety orientation training, effective job training and provision for participation in group and departmental safety activities will all be needed to provide necessary safety motivation to workers.

MUST UNDERSTAND LEARNING PROCESS

The supervisor who understands certain simple concepts regarding learning will save himself untold aggravations and insure more pleasant relations in giving instructions and supervision to his employes. If he understands the fundamental principles of learning, he will use his energy best in giving instructions.

Learning is a process of forming habits. This requires a series of actions or experiences on the part of the one who is learning.

Many things may be done or caused to influence the rapidity with which habits are formed, but it is fundamental that the learner must take part in the process physically and mentally. As many of the senses as possible should be supplemented effectively by an appeal to thinking for the most rapid habit-forming. Learning requires participation on the part of the learner as well as repetition, until the habit of following a sequence of actions is developed.

Certainly if supervision is to provide job safety training, then all supervisors should be trained in the techniques of job instructor training.

The question before safety and training people today seems to be, "How can we most effectively deliver the goods?" Industry demands from all of its functions, departments and services a good return for every dollar expended, including the costs for safety training. It is not a question of doing something in order to get something done for the record. It is a question of doing a needed job when it is needed and doing it well.

SUCCESS DEPENDS ON WORKERS

The success of safety training depends upon the changes that are taking place within the individuals working in the plant. Our success is measured in terms of frequency and severity. It is measured in terms of those in the plant who, as a result of safety training, habitually follow safe practices.

It is time we got our safety training into step with the age of automation. This, I believe, can best be done by not thinking of safety training as being different from other training. Training for safety can be accomplished most completely and efficiently when integrated into an overall, well organized, continuous training program.

by THOMAS E. SEAVEY

PLANNING safety INTO AUTOMATION

IN THE PLANNING, designing and building of automated equipment for industry, safety has assumed equal importance with the life of equipment, cost, productive capacity and similar requirements, as seen from the buyer's viewpoint. Since the purchaser of new equipment is vitally concerned with safety, the automation manufacturer also has become concerned.

The ultimate user of this equipment is interested from a humane and economic standpoint. Safety no longer is a byproduct but has become a major objective of manufacturers. It is not good business to injure your employes when, through a concerted, conscientious effort, these accidents could be minimized or eliminated.

This is aside from the economic dollars-and-cents approach, in light of the rising insurance and compensation costs. The costs of an accident are not measured only in tangible black and white figures but also in hidden costs, suffering and sorrow.

Industry has been successful in meeting its problem to the extent that it now is far safer to be at your job working than to be at home. Statisics show that the home accident rate is many times greater than the industrial accident rate. A goodly portion of this success can be ascribed to planning and forethought to prevent accidents before they can happen.

ADVANCES BRING NEW PROBLEMS

Equipment has undergone an evolution to meet the needs of industry. Technical advances have been necessary to keep costs down and manufactured products within the reach of the consumer. Inherent in this evolution have been problems of control, lubrication, materials and safety.

The complexity of this equipment normally makes safety not only more necessary but also more difficult to attain. In the days of the simple drill press, an off-and-on switch was more than adequate from an electrical standpoint, with guarding at a minimum. Incorporating this drill press into an automated line multiplies the hazards many fold.

There are certain criteria that should be mentioned from a planning or design stage—keeping in mind, however, that no one set of rules can cover all eventualities in the design of a complex, special-purpose piece of automated equipment. Some rules will have to be violated in the interests of other considerations. Still, the hazard should not be allowed to exist. A new approach may have to be instituted to cover the particular application.

For purposes of discussion, the basic rules will be divided into three categories—general, electrical and mechanical.

REVIEW GENERAL CONSIDERATIONS

Those safety considerations which cannot be classified readily as strictly mechanical or electrical will be examined as general recommendations.

There is, and always has been, a definite need for some signal to indicate that a piece of automatic equipment is about to be started. Due to obstruction of view, by its very nature automated equipment is difficult to clear visually before starting. A suitable audible signal should be installed in a timed circuit, compelling the operator to sound the signal before the machine will operate. Some manufacturers now incorporate these devices into their equipment.

Thomas E. Seavey, master mechanic for Pontiac Motors Division, General Motors Corporation, joined Pontiac in 1926 as a tool and gauge maker. Moving upward in the company, he was appointed to his present position in 1953, has taken an active part in Pontiac's post-World War II reconversion, including the installation of its highly automated V-8 engine plant.

For operation of automated equipment, air is not desirable from a safety standpoint. Air is difficult to control, compressible, easily contaminated and expensive. It is the difficulty in controlling and the compressibility that cause air to be inherently unsafe. Air-operated equipment may be shut down electrically and still be dangerous because motive force, air under compression, remains.

During sudden stoppages, when a part may be wedged into the transfer mechanism, unless the air system is bled the part or transfer mechanism can do great damage when released. This damage easily could involve persons releasing the stoppage.

Air operation varies with regard to control, due to moisture, drops in line pressure and subsequent erratic action of air. There are instances when hydraulic equipment is not applicable and air must be used but, normally, air is not as desirable.

In the design stages, shear and pinch points in automated equipment are one of the most fertile fields for safety accomplishment. If machines could be designed more "wide open," it would eliminate some places where people can be trapped and a serious injury result.

Some machines are so designed that, on the rear of their horizontal wing units, a person could be caught between the returning head or slide and the supporting base unit. These areas or pockets, shown in Figure 1, require particular attention. They can be corrected by simple changes in the design stage.

Bridge supports used to maintain upper mechanical units, such as transfer bars and hopper feeding units through which the part is transferred, normally are designed so close to the minimum clearance that a serious pinch point is created (Figure 2). Attention to these factors during planning stages would eliminate many hazards.

Inspection gates should be provided on some types of automation. Many times, certain types of parts must be removed after a critical operation to determine whether the parts are being machined within limits. Provisions should be made for properly interlocked gates which would allow a part to be skidded or moved without the back-wrenching lifting that often is necessary.

Swinging or rotating type loaders or unloaders frequently are serious safety hazards. These loaders normally work very quickly and the cams, trip levers and control switches create a large number of pinch points. This situation is compounded if the mechanism is operated by air. A piece of this type of equipment is virtually impossible to guard, particularly to protect the repair or setup man.

Figure 1—Michigan Drill Head: Pinch point between slide and horizontal base support creates a trap for foot of unwary operator.

In the general machine setup, hydraulic lines, conduit and air lines should be kept clear of the floor to eliminate stumbling but also should be kept high enough to prevent hitting one's head on them. Pipes along the floor, or just above the floor, make too convenient a place to stand or lean. Usually, a worker easily can slip off of one of these pipes and injure himself.

Machines should be fitted with sensible guards that are a forethought rather than an afterthought. Some guards create a greater hazard than the hazard of the machine being guarded. Guards should be arranged so they can be replaced easily after tool

change or repair or they will not be used to advantage. A guard which is difficult to replace should not be used. Guards of expanded metal that permit visual checking of machine operation without guard removal are widely and successfully used.

DISCUSS MECHANICAL CATEGORY

There are a large number of safety considerations which fall into the mechanical category, even though the mechanical and electrical classifications often are tied closely together.

The majority of automated machines and automated equipment between machines is not designed or constructed substantially enough to withstand the stress imposed by mass production. Bracing, casting cross sections and screw sizes often are too light to retain their original alignment and accuracy. Consequently, the twisting and moving of the equipment causes accelerated wear and reduced safety.

When weight is not a prime consideration, heavier construction almost always is advisable to preclude the possibility of permanent distortion when the unusual occurs, such as jams, wrecks, broken parts or cutters and sudden stoppages.

While equipment is on the drawing board, the shop maintenance man frequently is the forgotten man. An objective that normally is considered all too infrequently is accessibility for repair. This applies even to accessibility for minor adjustment which must be made relatively often. Machines have been designed, built and put into service which require a very small man to make repairs and adjustments. Such cramped working space can only lessen safety.

Cylinders, fittings and lubrication facilities are placed in available space rather than in a planned location. Some cylinders have been so hidden as to require a major teardown to remove them for maintenance such as packing replacement (Figure 3). Some pieces of equipment appear to have been assembled around the milling and drilling heads, making them almost entirely inaccessible except from atop the machine (Figures 4 and 5). Working from atop a machine is a great hazard because coolant and lubrication cause unsure footing. A large porton of industrial accidents are from falls.

Machines built along these lines normally are hazardous even for a jobsetter to change and set tools. Machines which must be climbed onto for changing or adjusting tools or fixtures are not uncommon. Built-in walks or stiles on machines of this nature do much to reduce this hazard. Walks or steps of smooth metal are almost as poor as none at all, however.

There are materials on the market, of the expanded metal type, which are excellent for the fabrication of stiles or walks. These materials retain their skid resistance even after long use. The walks do not become hazardous from oil, water or other material which would cause a surface to be slippery (Figure 6).

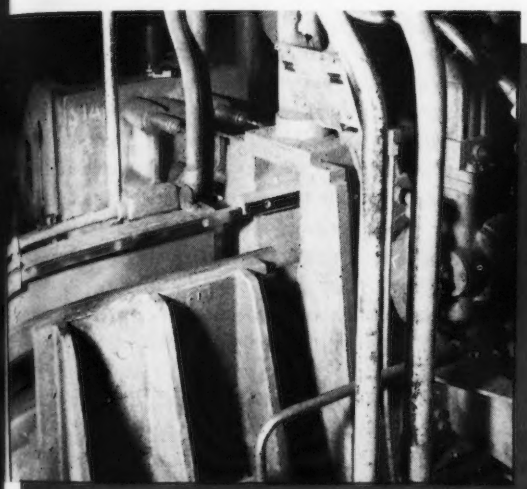


Figure 2—Barnes: When part being machined passes through bridge support, pinch point is created.

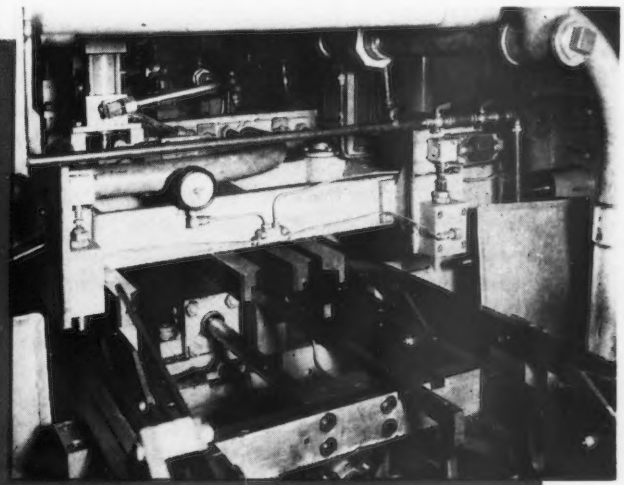


Figure 3—Michigan Drill Head: Hydraulic cylinder is located so as to make regular maintenance difficult.

Hydraulic equipment on automation or automated equipment always should be run on minimum pressures or only enough pressure to overcome operating resistances in normal operation. Operating equipment at abnormally high pressures causes undue strain to the structure of the equipment and, in sudden stoppages, could multiply the damage and subsequent hazards.

All hydraulic equipment should be banded or otherwise permanently marked for proper operating pressures and settings. This procedure, in addition to its safety benefits, many times aids in trouble shooting because it indicates conditions of abnormality that point toward possible maintenance problems.

In addition to identifying pressures, it is wise to have indicated on the control valves the direction of motion of the element controlled when the valve is manually operated in a particular direction. Many times solenoid-controlled valves must be moved manually for some reason of setup, checking after a repair is made or, most important, releasing someone caught in the machine. To know which direction the transfer bar will operate when the valve is manually pushed in one direction or the other is very valuable and, in some cases, could mean the saving of an arm, a leg or a life.

Regarding lubrication, a central lubrication system on a machine or piece of automation almost is a "must." The day of the individual fitting or oil cup long since has passed. Although central lubrication has been a long step forward toward safer maintenance of equipment, there have been other hazards that have accompanied its use. The control of lubrication systems of the various types sometimes causes the use of too much lubricant, which finds its way to the floor and creates its own hazard.

A possible solution to the problem is that all ways and other surfaces involved in expended lubrication be provided with drain troughs channeled into a tank or system through which the surplus lubricant can be controlled. Many plants make use of this expended lubricant in the reclaiming process, in which quantities of cutting oils are made. Certainly, in any event, provision should be made to prevent this material from creating an additional hazard.

All filling facilities on central systems, hydraulic systems and grease fittings should be arranged, depending on application, to be out of the danger areas of an operating machine. Almost all of the lubrication of equipment is accomplished while it is in operation.

Overhead automation with lubrication facilities, and even air line lubricators, should be serviced from the floor level rather than having workers use ladders or climb onto the equipment. There are air line lubrication systems in use that can be filled automatically from a central tank at floor level, keeping the level in the lubricators overhead at a working level without the hazardous necessity of climbing up to them.

Washers built as a part of an automated line are cause for a possible accident if the inspection or access doors have been removed while the equipment is potentially operative. Should the rest of the line cycle cause the washer to operate with these doors open, serious injury could result. Access or inspection doors which, if left open, could cause injury should have the steam valves, pumps and

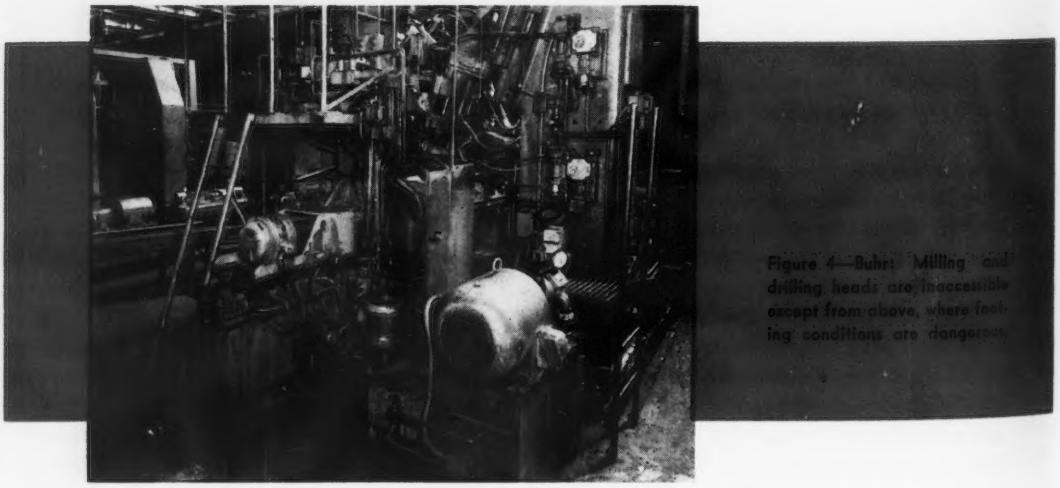


Figure 4—Buhr Milling and drilling heads are inaccessible except from above, where footing conditions are dangerous.

other apparatus tied into a safety circuit controlled by limits on these doors. Thus, if a door were open, even if the rest of the line cycled, the washers would be inoperative—a situation true of much of the new automated equipment.

A section will appear harmless because of a condition elsewhere on the line, when actually it is much like a loaded gun waiting to be triggered.

In fixture design, the use of controlled air blow-offs to clean locating pads often is a safety feature. Here, there is no necessity for the operator to reach into the machine with risk to himself to clean the locators. Properly placed and controlled, these devices are an advantage.

POINT OUT ELECTRICAL NEEDS

Electrical automation safety leaves much to be improved. It appears that, although there is some effort toward standardization, safety is not always a prime objective.

Many plants have a general safety rule that a machine must have the master disconnect switch locked in the "off" position before a machine is to be worked on by maintenance people or jobsetters. This rule, although important from a safety standpoint, is difficult to enforce, particularly if the disconnect switch is inconveniently located, as on an elevated platform or at one end of an extremely long machine. It is advisable to have this disconnect on the floor level and normally as close to the midpoint of the machine as possible. A rule that is convenient to obey is far more readily enforced than one requiring extra effort.

Many machines are built without emergency safety stops—or the stops are not readily accessible. Emergency stops should be arranged to be available from virtually every spot on the machine and from either side. A widely used application of this type of stop, particularly on long extended machines, is the safety cord. It might be added at this point that all of the machine's functions and its related equipment should be stopped when this safety stop is applied.

Recessed start buttons on equipment are vital as indicated by the number of accidents that occur when a person's body comes in contact with an exposed start button while the machine is being repaired or tools changed. This is especially true if the lockout rule is violated.

Since in many machines hydraulic power is used to activate the various functions of the machine before transfer hydraulic pressure can be applied, all panel switches must be on. This would cause one of the most potentially dangerous elements of the machine to remain inoperative until the rest of the machine is made ready to cycle. Some machines are arranged so that, if one section is shut down, the transfer through this section could operate because it gains its pressure from a hydraulic unit connected to a still-active adjacent section. Locking out one transfer section does not assure safety.

Through an economy effort, much equipment is made with single solenoid spring return control valves. These economies are soon lost through the potential accidents possible in their use. A positively placed valve spool in a two coil valve is far superior because of the possibility, on a single coil valve, of the spool creeping or becoming mislocated and causing subsequent jamming, erratic cycle. By all means, double coil valves should be used wherever possible.

In equipment operated pneumatically, the trapped air compressed against a sudden stoppage is as

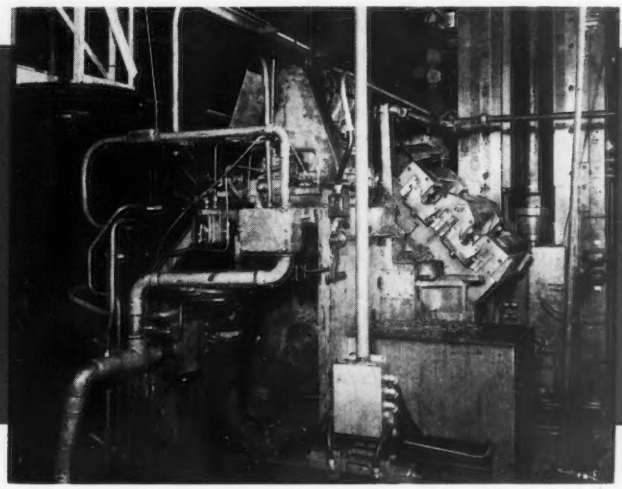


Figure 5 — American Broach: Changing center drills necessitates climbing machine, exposing operator to falling hazard.

dangerous as a coiled spring. Electrically, a solenoid controlled dump valve should be arranged to dump all air pressure to the machine when the stop or emergency stop button is used. This accomplishes the same thing as shutting off the hydraulic system in a hydraulically controlled machine; the source of the moving force is removed and, in the case of the air operation, the back pressure is dumped.

Automatic washers, ovens and blow-off section should be arranged to become inoperative when the covers or access doors are removed for inspection or repair. These safetys would cause all pumps, hot water and steam facilities to be shut off until the doors and similar units were replaced. At this time the machine could be recycled and placed in automatic cycle.

A necessary evil in automatic equipment is the finding of what is wrong when it does not cycle as it should—in other words, "trouble shooting." Many accidents occur on automation during this period, when a repairman must subject himself to certain hazardous situations.

Many times a machine must be left in the "as occurred" condition so a repairman can correct a fault after discovering the cause of the irregularity. Often, if a machine fails to cycle and is shut down, an electrician cannot determine what is wrong or what piece of equipment failed. Because the power must be left on, it presents certain hazards conductive to accidents. Placement of limit switches in areas easily reached without subjecting the repairman to serious hazard is advisable.

Remote controlled limit switches are advantageous for the preceding reason and because applications requiring a coolant normally move the switch out of the coolant area. Limit switches shorted by coolant also are potentially dangerous.

A machine of automatic nature should in general be wired to a failure-safe. That is, if a switch fails, the machine will not become a hazard. An example of this is the feed of a milling head, which should be designed so that, if a rapid traverse limit swtch fails, the machine would be in fine feed. This eliminates the possibility of a machine going into the work in rapid advance.

CONCLUSIONS

The element of fluidity is inherent in the preliminary design and layout of the components in an automated production line. For instance, experience supporting this information has shown that the engine cylinder block line design could be helped by lessons learned in previous automated block line building. There were existing lines where debugging had made considerable progress. But the engine camshaft was on virgin ground and the design had to be taken from the air.

In spite of this difference, both lines were alike in that they had to be custom tailored to the floor plan and the work piece and did not lend themselves to the stipulation of rigid safety specifications, other than those applicable to standard installations. It was not until the preliminary design had left the drafting board that it could be attacked from the safety angle.

A team composed of Pontiac process engineering, plant layout, plant engineering and production supervision personnel and the equipment builder's engineers began the real work of constructive criticism and suggestion. An important part of that work was the detection and removal of potential hazards. This scrutiny continued through the building and initial tryout on the builder's floor and through the activating on the factory floor. The Safety Department was called in to inspect before and after. Of necessity, this scrutiny has never ceased. There were no rules; there were only problems on safety which had to be solved—and solved before they turned into traps.

Figure 6—Use of skid-resistant expanded metal in step fabrication reduces slipping hazard on stile.

SELLING A SAFETY PROGRAM TO TOP MANAGEMENT

by JOSEPH A. MENENDEZ

THE TITLE OF THIS ARTICLE implies, advisedly, that top management is a prospective buyer and we safety engineers are the hopeful salesmen. We have a safety program to offer top management. It is my purpose here to consider approaches which may be used to assure this "sale."

Top management, as any prospective buyer, must have a need for a product in order to be receptive. So it is imperative that, as salesmen, we show our "buyers" their need.

SAFETY MEANS EFFICIENCY

To sell a safety program to top management, my first suggestion is to demonstrate that accidents are inefficiencies and that an effective safety program is an efficiency measure. Top management, since it has a responsibility to its stockholders to maintain an efficient operation, is interested in measures that produce efficiency. It's good business.

We must keep top management informed with facts. Tangible information—ammunition—can be found in the intelligent use of statistics, for statistics reveal that accidents are inefficiencies. Top management people, having many reports to review and digest, welcome statistics that are concise and can be readily studied and understood. And to be most palatable and easily digested, these statistics should reveal trends.

Since frequency and severity rates are well established evaluations which can aid in conditioning top management for the "sale," I suggest they be used in a way that will indicate a trend: include year-to-date frequency and severity rates in your monthly reports.

Monthly Rate Reports—At the Falstaff Brewing Corporation we use a frequency and severity rate form (Figure 1) which is not uncommon. It keeps top management informed by individual Production and Maintenance Departments and by totals for these departments.

This distinct separation has been made to pinpoint responsibility so that top management can see readily exactly where a weakness may be and who is responsible. The drivers, miscellaneous and semimonthly figures are listed separately for the same reason. While the separations entail more effort on our part, they give top management a report that is easy to understand. It is not a report that just says, "We are doing well (. . . or poorly)," but one that pinpoints the strong and weak areas.

This monthly report also gives top management the year-to-date rates. One month's rates alone are not conclusive and management wants to know how we are faring to date.

Box Score Notice—We use another form which is primarily a bulletin board notice (Figure 2), but also is sent to top brass. It gives a simple year-to-date plant comparison of frequency and severity rates in the upper box score, as well as the number of days since the last disabling injury. A footnote explains that the figures include only the experience of the plant Production and Maintenance Departments and that these figures indicate frequency rate standings and not interplant safety contest standings. A lower box score reveals the current and previous year's lost time injuries for plant depart-

Joseph A. Menendez, safety director of Falstaff Brewing Corporation since 1954, joined that company after serving in the same capacity for 12 years with American Zinc. A Society member since 1945, Mr. Menendez is a past treasurer and past general chairman of the St. Louis Chapter. Also, he was one of the organizers, East St. Louis Safety Council.

ments by month and year to date, and the frequency and severity rates for the year to date

It is a simple report which gives facts at a glance and indicates a trend. Lengthy reports showing comparisons of five, ten or more years are too comprehensive and should be used only for a specific purpose or periodically.

Direct Expense Reports—Another selling point, effective with top management, is the direct injury expense report. This report is truly tangible. It points out efficiencies and deficiencies in a language in which top management is very fluent—cost figures. Direct injury cost figures cannot be juggled. They are facts that are cut and dried.

One of our three direct injury expense reports (Figure 3) is an annual report of injury costs by plant, per barrel per employe, for the four plant Production and Maintenance Departments. It also shows the previous year's comparative costs. These cost figures include the medical, hospitalization and workmen's compensation paid on all closed or completed injury cases and the reserve figure on open or pending cases.

Another report (Figure 4) reveals these same costs by departments, which pinpoints for top management any efficiencies and deficiencies. Again, this report gives a guide or trend to follow with the previous year's comparison.

A third report (Figure 5) picks up the drivers, the semimonthly and the miscellaneous group to complete the picture.

These figures are obtainable from the insurance carrier or, if self-insured, from the Insurance Department or Accounting Department. These should be presented so that top management can study them by department, by plant or, in general, by total costs.

(Incidentally, I know of no company that includes these costs as production costs, which actually is what they are. If a bottler is injured in one of our plants, it has cost Falstaff that much more to bottle the product on that particular shift.)

Quarterly Injury Costs—The Safety Department sends our plant superintendents quarterly cost reports by department and individual injury cases to keep them posted currently. Several of our plant superintendents requested this report after we started our interplant safety contest, which includes injury expense as an important category. Quarterly reports, they felt, kept them posted and they could direct their efforts accordingly.

FALSTAFF PLANT No. _____

Frequency and Severity Rates

MONTH OF _____

19__

DEPARTMENT	No. Emp.	MAN HOURS		LOST-TIME INJURIES					TIME CHARGES		FREQUENCY AND SEVERITY RATES		
		Month	Year to Date	Total No.	Perm. Part.	Temp. Total	Total Month	Total Year	Month	Year	Freq. Month	Sev.	Year to Date Freq.
Brewing													
Bottling													
Engineering													
Construction													
TOTAL PLANT													
Drivers													
*Miscellaneous													
Semi-Monthly													
CONSOLIDATED													
**ADJUSTED													

REMARKS:

* Guards, Advertising, Timekeepers, Etc

* * To be used only at end of the year

FORM 0-020 398 Rev 7-56

Figure 1—Monthly Frequency and Severity Rate Report

Statistics are facts that must be used to sell a safety program to top management. If they reveal efficiency, the selling point is that the safety program is needed to maintain that efficiency. If deficiencies are revealed, the need of a stimulated safety program to eliminate them is indicated.

The foregoing emphasis on cost figures perhaps needs some qualification to put this section in proper perspective, especially for the misinformed who picture top management as interested only in the dollar sign. Actually, top management is made up of people who are, in my experience, very sympathetic and kind. Many, in the past, have been closely associated with employes, many have visited injured and ill employes in the hospital and in the home.

These people at the top are just as humane today as they were previously: they do not want to see their employes suffering and losing wages. As corporations become larger, however, top management often has found it necessary to delegate this personal attention to department heads, supervisors, personnel managers and safety personnel, just as it has had to delegate responsibility for maintaining machines and equipment in which top management still is interested but to which it no longer can attend personally.

"GHOST WRITE" PROMOTIONAL MATERIAL

My second suggestion for selling top management a safety program is for the safety director or engineer to be a ghost writer.

Top management does not have time to prepare letters, directives or memorandums to key personnel on safety. Neither does it have time to prepare them for the Sales or Advertising Departments or the many other departments.

The safety director has been delegated the responsibility by top management for selling safety to all personnel. And one of the best mediums is an occasional letter to key personnel from top management—from the big boss.

For instance, a letter from the president to all drivers of company vehicles may be in order during a national or local traffic campaign. And no one is better qualified than the safety director to prepare a suggested letter on this theme for the president.

If letters such as this are prepared intelligently and concisely, top management will appreciate the opportunity to do its part. A word of warning: don't overdo it. Management may tire of it or it may lose its effectiveness if it becomes too commonplace.

Another writing job for the safety director: the frequency and severity rates may merit a compliment or a reprimand from the corporate production manager. The safety director who has made a careful study of existing conditions can include pertinent points for emphasis which will be most effective in a letter or memo for the production manager to send to department heads and supervisors.

Our annual injury expense report is sent to key management personnel by our executive vice president and general manager. He sends a letter of transmittal with these reports which includes suggested remarks prepared by the safety director.

This letter (Figure 6) reads, in part, ". . . This tells me that not only dollars and cents have been saved but also that less suffering has been experienced by our Falstaff family and less time has been spent in the doctor's office, in the hospital and away from work. . . It spells efficiency—better operation of your respective departments. . . Congratulations, etc. . ."

This message, coming from top management, is much more effective than it would be coming from the safety director. The safety director can prepare such a suggested letter and present it to the top brass for approval, thus relieving them of valuable time preparing such material—and you are selling your safety program to them simultaneously.

For those who are reluctant to offer top management suggested letters or remarks, for fear they may be disregarded, I have found it true that the bigger the man, the more receptive and appreciative he will be. My immediate superior, our personnel director, has encouraged me to prepare letters for him on safety policies or subjects, directed to his personnel managers and the higher echelon.

Carefully worded, concise letters or memorandums, prepared for top management, not only help to sell the safety program to them but also put teeth into your overall program. It keeps management interested and all other levels on their toes.

URGE ACTIVE PARTICIPATION

My third suggestion is to make top management people active participants in the safety program. This can be achieved without consuming too much of their valuable time and effort.

Do not let them become figureheads. Mr. Webster defines the word "figurehead" as "a nominal, but not real, head; one who allows his name to be used to give standing to enterprises in which he has no responsible interest or duties."

Top management people must not be considered figureheads in the safety program. They have interests and duties that are very real. We cannot afford figureheads in our organization and neither can you.

General or Steering Safety Committees in our operation are headed by the plant superintendent at each plant. He conducts the meetings and inspections. The department head has the same responsibility where such committees exist within the department.

Figure 2—Box Score on Lost Time Injuries

LOST – TIME INJURY SUMMARY

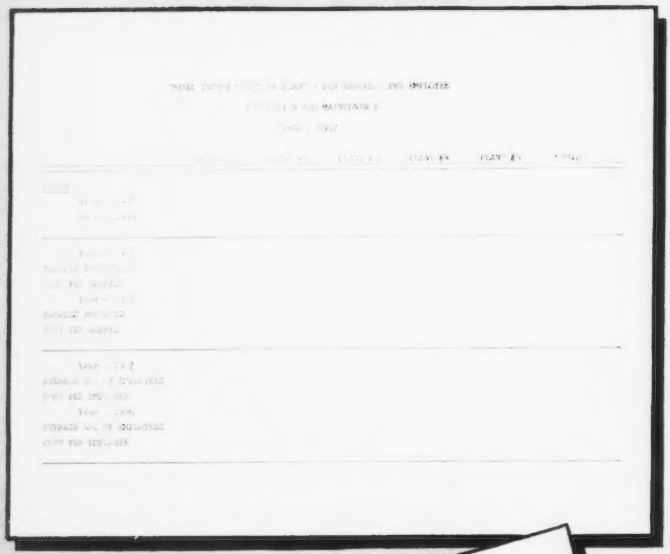
TO DATE – OCTOBER – 1958

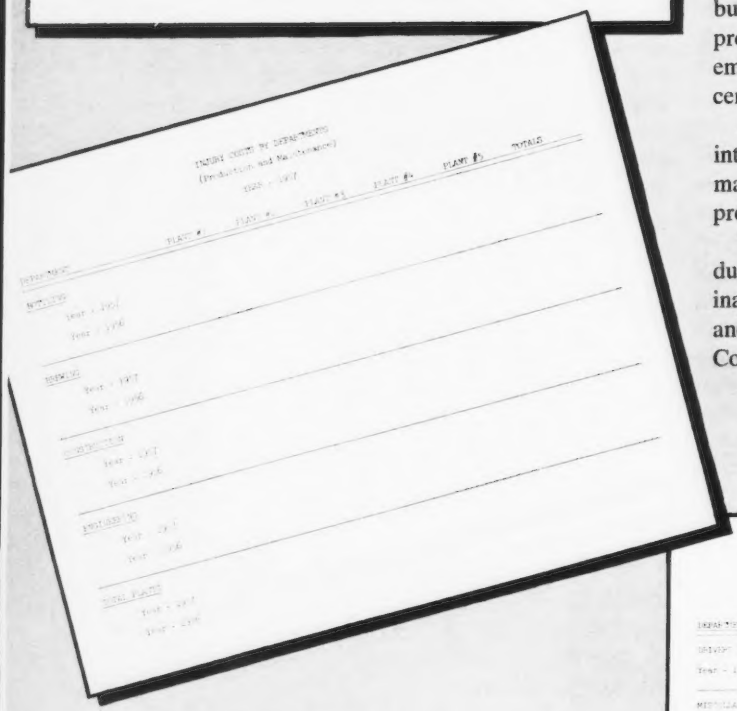
(Inclusive) .

POSITION	LOCATION	INJ. TO DATE 1958	INJURIES PER MILLION HOURS	DAYS LOST PER MILLION HOURS	DAYS SINCE LAST INJURY
1	Plant (5)				
2	Plant (2)				
3	Plant (1)				
4	Plant (4)				
5	Plant (3)				
6					
7					
8					
TOTAL					

These figures include experience of the Brewing, Bottling, Engineering and Construction Departments. They are used as factors in Inter-Plant Safety Contest but do not indicate standings in the contest, merely indicate standings in accident frequency rates.

BOX SCORE	1958	1957
Number of Lost-Time Injuries - October		
Number of Lost-Time Injuries - To Date		
Lost-Time Injuries Per-Million Man-Hours		
Days Lost Per-Million Man-Hours		





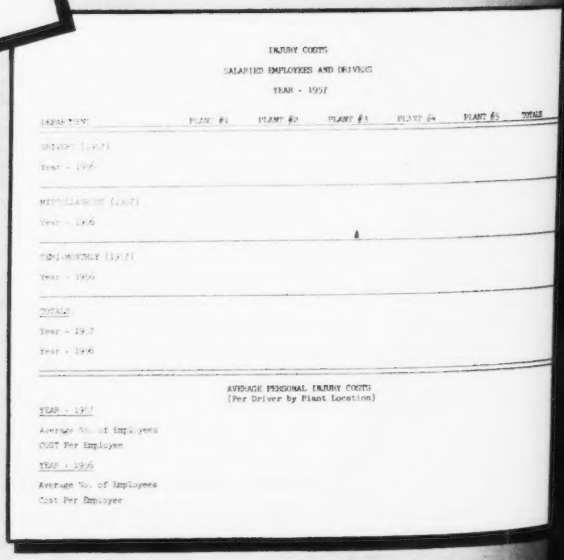


Figure 3—Annual Report of Injury Costs by Plant (per barrel per employe)

Figure 4—Annual Report of Injury Costs by Department (production and maintenance, all plants)

Figure 5—Injury Costs for Salaried Employes and Drivers (and average personal injury costs)

These persons are top management in their respective areas. They have the responsibility of the health and safety of the personnel, equipment and machines in these areas.

Many of you have seen at various management levels the individual who could not be sold on safety and who has been converted, completely and sincerely, into one of the best safety salesmen in the organization when this responsibility was placed solely on his shoulders. They become sold on the safety program as they become active participants.

If you conduct contests, stay in the background —be the script writer and channel materials, etc., through top management. Make top management an active participant not only at award ceremonies but during the contest. You not only sell the safety program to top management but to supervisors and employes as well by having top management's sincerity felt by all concerned.

At Falstaff we have devised a comprehensive interplant safety contest which has made our top management very active participants in our accident prevention program.

The contest is conducted by our corporate production manager. He announced the program, originally, and he sends out all pertinent information and correspondence. He has appointed a Judging Committee, which he heads and which includes the

company's secretary and assistant treasurer (who heads our Insurance Department), the personnel director, the superintendent of engineering, the superintendent of construction, our workmen's compensation insurance broker and the safety director.

It is the duty of these men, at two committee meetings each year, to report to the production manager on the status, as per contest schedule, of each plant. The committee does not make plant safety inspections in a body but, as the members' work takes them to the various plants, they observe and make note of physical conditions of the plants and the attitudes, not only for judging purposes but also for recommendations to improve existing conditions.

This contest serves top management as a guide and control, as the subjects included will reveal readily. As you can see from the rating form (Figure 7), the "big three"—frequency, severity and costs—are the main "point getters" in the contest. The winner in each of these categories earns 100 points. All other categories can earn from 40 to 80 points. An index accompanied the point schedule form when the program was introduced. It explained the point system and what was expected in each category.

The contest has made safety tangible because it measures both by statistics and by effort exerted. It has given top management a tool with which to work on the prevention of accidents.

Points recently were raised by the committee, after the judging of last year's contest, when its members realized the importance of prompt and complete accident investigation reports and considered housekeeping from an efficiency and sanitation standpoint as well as for its accident prevention value.

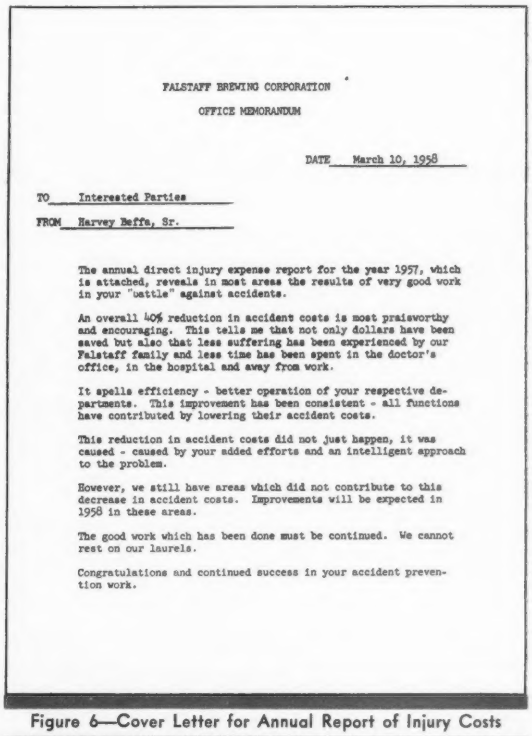
The contest is flexible. For instance, one of our plants has one of the best fire brigades in the country, for its size. It is trained by the local Fire Department and its members are auxiliary firemen to the city Fire Department and Civil Defense Organization. Several times each year, the local Fire Department sends a fully equipped fire truck, with a driver and captain, to train our plant Fire Brigade. Of course, this Fire Brigade receives full point value.

However, full points on this item also may be received in a plant located in a large city where the plant has a well organized, trained crew which is discouraged by its city Fire Department from having fire hoses in the plant. Set standards on this and many of the other contest items is very difficult. Existing conditions dictate to the committee its decisions. Also, points will be changed by the committee to improve weak areas.

The safety training category merits points from supervisory training courses which include a safety session and are conducted at plant level by the personnel manager, who is responsible for the implementation of the safety program at each plant. Also points are given for a three hour safety course offered by our insurance carrier at each plant and such courses as are offered by the National Safety Council or local safety councils.

Out-of-plant meetings merit points for attendance by supervisors, personnel managers or department heads at local safety council meetings, safety conferences or conventions, meetings of chapters of the American Society of Safety Engineers, etc. This encourages such management personnel to broaden their scope on accident prevention work. Other activities encourage each plant to develop its safety program by initiating slogans, gimmicks, contests, etc., and to participate in community safety campaigns such as traffic and bicycle safety.

Publicity on any plant safety activity is taken into consideration because it indicates added effort and is conducive to improving attitudes of employes as well as the public.



FALSTAFF BREWING CORPORATION

OFFICE MEMORANDUM

DATE March 10, 1958

TO Interested Parties

FROM Harvey Heffa, Sr.

The annual direct injury expense report for the year 1957, which is attached, reveals in most areas the results of very good work in your "battle" against accidents.

An overall 40% reduction in accident costs is most praiseworthy and encouraging. This tells me that not only dollars have been saved but also that less suffering has been experienced by our Falstaff family and less time has been spent in the doctor's office, in the hospital and away from work.

It spells efficiency - better operation of your respective departments. This improvement has been consistent - all functions have contributed by lowering their accident costs.

This reduction in accident costs did not just happen, it was caused - caused by your added efforts and an intelligent approach to the problem.

However, we still have areas which did not contribute to this decrease in accident costs. Improvements will be expected in 1958 in these areas.

The good work which has been done must be continued. We cannot rest on our laurels.

Congratulations and continued success in your accident prevention work.

Figure 6—Cover Letter for Annual Report of Injury Costs

This contest is an effective aid in selling top management our safety program. It has made management an active and interested participant.

USE PUBLICITY AS SALES AID

The fourth suggestion I would make to sell a safety program to top management is that the safety director should "blow his horn" for safety—should make his wares known by the use of publicity.

It has been stated that "publicity is the voice of safety." We can use this voice to help sell our product. Publicity—that is, "good" publicity—helps in the public relations efforts which are a constant activity of management.

Safety, a noncontroversial subject with much human appeal, can be and should be publicized. Public relations and publicity for safety is a subject in itself and I will take only a few sentences to touch on it. For those who may be interested in more information, the 1955 edition of the NSC *Accident Prevention Manual for Industrial Operations* has a very interesting article on this subject.

If you have a Public Relations Department, you should consider it part of your job to work closely with it. Remember, however, that this department is interested in newsworthy material; don't burden them with routine activities.

The Public Relations Department often can use articles and photographs for the company or plant house organ. It can pass on to trade magazines, newspapers and radio and television stations whatever news material you submit which may be appropriate for such media.

If you have no Public Relations Department, make some contacts yourself with the above mentioned media. But use discretion and send only what may appeal to the reader or listener.

Publicity is news resulting from activity. Top management knows this and recognizes the efforts exerted and results achieved.

SELL SELF TO MANAGEMENT

My fifth and final suggestion to sell the safety program to top management is to sell yourself.

I do not think much elaboration is necessary but I will mention several suggestions that are, in my opinion, essential in selling yourself.

A safety engineer must be sincere and deeply interested in his work. As a good salesman, he must first be sold on his product himself.

His enthusiasm must be such that it is catching, so it will permeate throughout the organization, including top management. This enthusiasm must reveal an intense, profound and eager interest with a liveliness of imagination and an ardent zeal for this "safety" product he believes to be so worthy.

He must be able to accept "no" for an answer and yet not be a "yes" man. He must put up a fight for what he thinks is right, yet accept an occasional defeat gracefully.

He must respect and be respected.

In a nutshell—by doing his job well, he is selling top management on both himself and his safety program.

SUMMARY OF SUGGESTIONS

In summary, here briefly are the five suggestions I have made for selling a safety program to top management:

1. Give top management facts, statistics presented intelligently, to reveal that accidents are inefficiencies and that your safety program is an efficiency measure.
2. Help top management people help you by being a ghost writer. Prepare suggested letters or memorandums which they may send to key personnel.
3. Make top management an active participant in the safety program. Don't let it be a figurehead.
4. Blow your horn for safety by publicizing safety activities.
5. Be sincere and enthusiastic and do your job well so that you will sell yourself and your program to top management.

Figure 7—Interplant Safety Contest Rating Form

PLANT NUMBER	FREQUENCY (100)	SEVERITY (100)	COST INS. (100)	PLANT INSPECTION (40)	COMMITTEE MEETING (40)	DEPARTMENT INSPECTION (60)	DEPARTMENT MEETING (60)	ACCID. INVESTIG. REPORTS (80)	MINOR INJURY REPORTING (40)	BOOKKEEPING (80)	FIRST-AID FACILITIES (50)	FIRE BRIGADE (50)	SCOREBOARD (PLANT) (40)	SCOREBOARD (DEPT.) (40)	FIRST-AID TRAINING (50)	EMERGENCY PROGRAM (40)	SAFETY TRAINING (40)
#2																	
#3																	
#4																	
#5																	
#6																	
#7																	
#8																	
#9																	

Index numbers at top of page correspond with Schedule Index.

Figures in parenthesis ( ) indicate maximum points per heading.

Maximum aggregate point total -- 1,100.

AMERICAN SOCIETY OF SAFETY ENGINEERS

The Creed

I am a Safety Engineer. In my profession I take deep pride, but without vainglory; to it I owe solemn obligations that I am eager to fulfill.

As a Safety Engineer, I will participate in none but honest enterprise. To him that has engaged my services as employer or client, I will give the utmost of performance and fidelity.

When needed, my skill and knowledge shall be given without reservation for the public good. From special capacity springs the obligation to use it well in the service of humanity, and I accept the challenge that this implies.

Jealous of the high repute of my calling, I will strive to protect the interests and the good name of any Safety Engineer that I know to be deserving; but I will not shrink, should duty dictate, from disclosing the truth regarding anyone that, by unscrupulous act, has shown himself unworthy of the profession.

Since the Age of Stone, human progress has been conditioned by the genius of my professional forbears. By them have been rendered usable to mankind Nature's vast resources of material and energy. By them have been vitalized and turned to practical account the principles of science and the revelations of technology. Except for this heritage of accumulated experience, my efforts would be feeble.

I dedicate myself to the instruction of younger members of my profession in all its arts and traditions. To my Fellows, I pledge, in the same full measure I ask of them, integrity and fair dealing, tolerance and respect, and devotion to the standards and the dignity of our profession; with the consciousness, always, that our special expertness carries with it the obligation to serve humanity with complete sincerity.

AMERICAN SOCIETY OF SAFETY ENGINEERS

Membership Information

THE American Society of Safety Engineers has established the following classifications of active membership.

MEMBER — To be eligible as a Member an applicant shall be at least thirty years of age and shall be engaged in safety engineering. In addition, he shall have either an engineering or science degree in an accredited college curriculum and the equivalent of eight full years' experience in safety engineering; or he shall have had the equivalent of ten full years' experience in safety engineering.

ASSOCIATE MEMBER — To be eligible as an Associate Member an applicant shall be at least twenty-five years of age and shall be engaged in safety engineering. In addition, he shall have either an engineering or science degree in an accredited college curriculum and the equivalent of three full years' experience in safety engineering; or he shall have the equivalent of five full years' experience in safety engineering; or he shall have either an engineering or science degree in an accredited college curriculum, ten years' experience in professional engineering work and one full year's experience in safety engineering; or he shall have twenty years' experience in engineering work, of which at least ten have been at the professional level, and one full year's experience in safety engineering.

JUNIOR MEMBER — To be eligible as a Junior Member an applicant shall be at least twenty years of age and shall be engaged in safety engineering work, which if pursued the required time will tend to qualify the applicant for the classification of Associate Member. In addition, he shall have either an engineering or science degree in an accredited college curriculum or he shall have had the equivalent of one full year's experience in safety engineering.

AFFILIATE MEMBER — The Society also provides a special classification, that of Affiliate Member, for those not professionally engaged in safety engineering. To be eligible as an Affiliate Member an applicant shall be at least twenty-five years of age and shall have contributed to the advancement of safety engineering through demonstrated achievement in some related field of interest in which he has been engaged for at least three years.

for additional information write to

The American Society of Safety Engineers
5 North Wabash Avenue, Suite 1705
Chicago 2, Illinois
(or contact your local chapter)